

Application Number 10/807,821

Amendment in response to Office Action mailed October 4, 2007

REMARKS

This Amendment is responsive to the Office Action dated October 4, 2007. Applicants have canceled claims 1-9 and 17, and amended claims 10, 14-16, and 18-20. Claims 1-16 and 18-20 are now pending.

The Office Action set a one-month period for reply. However, Applicants called the Examiner on October 31, 2007, and the Examiner indicated that the one-month period for reply should have been a three-month period for reply. Accordingly, Applicants believe that the current reply is due by February 4, 2008, with a one-month extension of time. If any additional extension fees are due at this time, please debit the deposit account listed at the end of this Amendment to cover such fees.

Restrictions/Elections Under 35 U.S.C. § 121

Restriction

In the Office Action, the Examiner restricted claims 1-9 and 10-20 under 35 U.S.C. § 121 as follows:

Group I. Claims 1-9, drawn to an apparatus with two reservoirs, a means for mixing the contents thereof & a nozzle for dispensing the mixture, with dependent claims directed towards various energy sources, which may be used to treat (cure) the dispensed mixture, classified in class 118, subclass 612 or 300+, or 641, or 621.

Group II. Claims 10-20, drawn to a process for fabricating a holographic data storage medium via mixing two components to create a formulation which is dispensed with a nozzle, with dependent claims directed to photocuring (UV), classified in class 427, subclass 512 or 162+, or 121.1+ (427.4).

During a telephonic conversation with the Examiner prior to the current Office Action, Applicants provisionally elected Group II with traverse. Applicants affirm this election *without* traverse.

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Election

In the Office Action, the Examiner also stated that the application contains claims directed to the following patentably distinct species:

curing via

- (1) heating or heating means
- (2) microwaves or microwave source
- (3) optical radiation and its source (includes photocuring and UV)

Applicants believe that the cancellation of claims 1-9 renders this Election Requirement moot, as these species were formerly recited in canceled claim 7. To the extent that Applicants must elect between these three identified species, Applicants elect species 3.

Applicants note that claims 18 and 19 are not mutually exclusive species. Claim 18 recites specific details of the curing of the multi-chemistry holographic formulation. Claim 19 recites sealing a perimeter of the holographic data storage medium using ultraviolet radiation. Regardless, the Examiner's Election Requirement indicates that photocuring and UV curing is the same species.

All pending claims are readable on species 3.

Claim Rejection Under 35 U.S.C. § 112

In the Office Action, the Examiner rejected claims 10-20 under 35 U.S.C. 112, second paragraph, as being indefinite. In particular, the Examiner objected to many different claims and phrases used by Applicants.

In response, Applicants have amended the claims in an attempt to address all of the Examiner's concerns. The different indefiniteness rejections are addressed in more detail below.

The Examiner objected to the preamble of claim 10 as not being commensurate with the body of this claim. According to the Examiner, no storage medium is necessarily made by the recited process, rendering the preamble unclear. In response, Applicants have amended the body of claim 10 to make it clearer that the process creates a holographic data storage medium.

The Examiner also objected to the term *multi-chemistry* in claim 10, indicating that this could have several different meanings. In response, Applicants note that the language of claim 10 specifically requires that the multi-chemistry holographic formulation includes a first component and a second component. Thus, the term *multi-chemistry* in claim 10 clearly refers to

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a formulation that includes two or more different components, and not any of the other hypothetical definitions proposed by the Examiner.

The Examiner stated that the phrase *mixing elements* could refer to elements of the periodic table or elements used for mixing (i.e., the mixer). In response, Applicants have clarified that the first set of mixing elements mix the first and second components and the second set of mixing elements further mix the first and second components. Accordingly, the phrase *mixing elements* refer to elements that perform the mixing and not elements from the periodic table.

The Examiner also objected to the use of relative terms without a baseline in claim 14. Applicants have amended claim 14 to eliminate the relative term.

For claim 14, the Examiner also objected to this claim as lacking enablement. According to the Examiner, the scope of claim 14 was not enabled insofar as the claim recited boron oxide coated on a dispense nozzle to reduce adhesion. According to the Examiner, the use of boron oxide on a dispense nozzle to reduce adhesion is not enabled because the specification does not recite every possible nozzle configuration, every possible boron oxide composition, or every possible coating location on the nozzle. While Applicants fundamentally disagree with the Examiner's rejection and any contention that Applicants are required to disclose every possible contingency in order to enable a claim limitation, the amendment to claim 14 (which eliminates the requirement that the boron oxide coating *reduces* adhesion) addresses the Examiner's stated concerns. Applicants clearly enable a nozzle coated with boron oxide and used in holographic media construction to inject a multi-chemistry holographic formulation between two substrates within an aligned cavity.

The Examiner indicated that claim 15 makes no sense, and stated that *holding two substrates to within one optical fringe* is a nonsense phrase. The Examiner also objected to the phrase *pre-aligning a cavity*. In response, Applicants have amended claim 15 to clarify that aligning the cavity comprises aligning the flats of the cavity prior to the two substrates being placed into the cavity. This amendment removes the phrase *pre-aligning* and addresses the Examiner's concern on this issue. In addition, Applicants have amended claim 15 to clarify that the two substrates are held such that parallelism of the medium is achieved to within one optical fringe.

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Applicants disagree with the Examiner's statement that *holding two substrates to within one optical fringe* is a nonsense phrase. Nevertheless, Applicants have attempted to clarify the language of claim 15 to address the Examiner's concerns. Optical interferometry, for example, can be used to measure the parallelism of a medium, and the parallelism can be quantified by a number of optical fringes. One exemplary system for making such interferometric measurements of the parallelism of the medium is shown in FIG. 10, and described in the present application. Accordingly, a person of ordinary skill in the art would have no difficulty understanding the meaning of the phrase *holding two substrates to achieve parallelism of the medium to within one optical fringe*, and would have no difficulty measuring for such parallelism or reproducing measurements of such parallelism.

In addition to the objections to claim 15, which the Examiner also applied to claim 16, the Examiner also objected to claim 16 as lacking clear configurational relationships. In particular, the Examiner indicated that it was unclear how the cavity would have an effect on the two substrates. The current amendments to claim 10 and comments above with respect to claim 15 should address all of the Examiner's concerns with respect to claim 16. Claim 10 now requires that outer surfaces of the two substrates are held to a substantially parallel position inside the cavity by the substantially parallel upper and lower flats.

Claim 17 has been canceled. However, the Examiner's concerns regarding the phrase *center dispensing* have been addressed in independent claim 1. In particular, claim 10 now requires that the dispense nozzle receives the multi-chemistry holographic formulation from the mixer and dispenses the multi-chemistry holographic formulation through one of the flats and through a hole formed in one of the substrates to dispense the multi-chemistry holographic formulation between the two substrates.

For claim 18, the Examiner objected to the phrase *write monomer* and indicated that the Examiner knows of no such adjective for describing a monomer. Although Applicants respectfully disagree with the Examiner on this point, Applicants have amended claim 18 to remove the adjective *write* and now refer to the write monomer as simply a monomer. For the Examiner's information, Applicants note that a write monomer, as used in the art of holographic data storage, refers to a monomer of a holographic recording material that reacts to recording

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light and cross-links to facilitate the recording of holograms. Regardless, claim 18 now requires a monomer, rather than a *write monomer*.

For claim 18, the Examiner also indicated that is unclear how a wavelength can be sensitive to any dye, indicating that it is usually the other way around. Applicants have addressed this concern via clarifying amendments to claim 18.

The Examiner also objected to claims 19 and 20 as relating to the preamble of claim 10. The Examiner appears to have objected to the use of the phrase *medium* which formally appeared only in the preamble of claim 10 and not the body of this claim. Applicants believe that the clarifications to claim 10 should address the Examiner's concern, but have also amended claims 19 and 20 to provide additional clarity.

Claim Rejections Under 35 U.S.C. § 103

In the Office Action, the Examiner rejected claims 10-16 and 18-19 under 35 U.S.C. 103(a) as being unpatentable over Colvin (5,874,187) in view of King (6,027,241) or Boatman (5,486,049); and rejected claims 17 and 20 under 35 U.S.C. 103(a) as being unpatentable over Colvin in view of King as applied to claims 10-16 and 18-19 and further in view of Eichsleider (6,425,968 B1).

Applicants respectfully request the Examiner's reconsideration of the claims in view of the claim amendments set forth herein. The applied prior art fails to disclose or suggest numerous features of the amended claims, and provides no teaching that would have led a person of ordinary skill in the art to arrive at such features.

As amended, independent claim 10 recites a method to fabricate a holographic data storage medium. The method comprises aligning a cavity such that an upper flat and a lower flat of the cavity are substantially parallel; mixing at least a first component and a second component to create a multi-chemistry holographic formulation using a mixer comprising a first stage including a first set of mixing elements that mixes the first and second components and a second stage including a second set of mixing elements that further mixes the first and second components, wherein the mixing elements in the first stage are larger than the mixing elements in the second stage; dispensing the multi-chemistry holographic formulation between two substrates inside the cavity using a dispense nozzle, wherein the dispense nozzle receives the

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multi-chemistry holographic formulation from the mixer and dispenses the multi-chemistry holographic formulation through one of the flats and through a hole formed in one of the substrates to dispense the multi-chemistry holographic formulation between the two substrates, wherein outer surfaces of the two substrates are held to a substantially parallel position inside the cavity by the substantially parallel upper and lower flats; and curing the multi-chemistry holographic formulation when the two substrates are held to the substantially parallel position inside the cavity to form the holographic data storage medium.

The applied prior art (either alone or in combination) fails to disclose or suggest these features.

The primary Colvin reference describes a photorecording medium, but generally concerns the media formulation and not any specific techniques for media fabrication. Indeed, the specific fabrication techniques used by Colvin are described on column 7, lines 3-29. As can be seen from the passage of Colvin at column 7, lines 3-29 (reproduced below), Colvin provides little or no detail on the structure or method for fabricating the media. It appears that Colvin was simply contemplating the creation of lab samples, and lacked any appreciation of many of requirements of claim 10.

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Fabrication

A typical schedule is outlined:

The mixed composition was prepared in a foil-wrapped brown bottle to avoid exposure to light. After mixing monomer and other low molecular weight molecules, photoinitiator powder was added, and the mixture was stirred to completely dissolve the powder. (Viscous) oligomer was added to the solution and the resulting mixture was stirred overnight on a jar mill to dissolve the oligomer. Peroxide stabilizer for bleaching photoinitiator residue was added just before use. Final compositions were filtered through 20 μm , 10 μm (nylon) and 3 μm (silver membrane) filters, in succession in a nitrogen-pressurized stainless steel filter.

A sample of the oligomer-monomer composition was sandwiched between glass plates.

Precuring was by flood irradiation at the $\lambda=546$ nm mercury-emission line. Precuring time was determined by monitoring in the near IR spectrum to follow diminishing peak heights due to polymerization of acrylate groups. The amount of unreacted monomer was measured to an accuracy of $\pm 2\%$. The quantity of retained monomer was varied for comparison purposes—20% was found to be a useful compromise between wanted matrix and exposure characteristics. (It is expected that batch-to-batch measurement will not be required in regular commercial production.) After precuring, samples are wrapped in foil for a shelf life of several months.

The King and Boatman references describe different types of mixing apparatuses. However, neither of these references contemplates the use of such mixing apparatuses for holographic media creation. Furthermore, other than describing mixing apparatuses, King and Boatman lack any relevance to many of the other requirements of independent claim 10.

The Eichlseder reference is unrelated to holographic media altogether, and instead concerns methods for bonding two halves of a DVD.

Several features of claim 1 are lacking from the applied references. As a very clear example, all of the applied prior art (either alone or in combination) fails to suggest a dispense nozzle that receives a multi-chemistry holographic formulation from a mixer (which includes two different sets of mixing elements) and dispenses the multi-chemistry holographic formulation into a cavity through an upper or lower substantially parallel flat and through a hole formed in

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one of the substrates to dispense the multi-chemistry holographic formulation between two substrates, wherein outer surfaces of the two substrates are held to a substantially parallel position inside the cavity by the substantially parallel upper and lower flats.

Since Applicants have made amendments that clearly distinguish Colvin, King, Boatman, and Eichlseder, Applicants reserve further comment at this time. Nevertheless, Applicants do not acquiesce to any of the Examiner's rejections or interpretations of the prior art. Accordingly, Applicants reserve the right to present additional arguments with regard to any of the independent or dependent claims.

CONCLUSION

All claims in this application are in condition for allowance. Applicants respectfully request reconsideration and prompt allowance of all pending claims. Please charge any additional fees or credit any overpayment to deposit account number 09-0069. The Examiner is invited to telephone the below-signed attorney to discuss this application.

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2/1/08

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